इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 1448-143 (1993): Methods of test for petroleum and its products, Part 143: Evaluation of white mineral oils by Ultraviolet Absorption [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

(Reaffirmed 2006)

भारतीय मानक

पैट्रोलियम तथा इसके उत्पादों के परीक्षण की पद्धति

[पी : 143]

परावैगनी अवचूषण द्वारा सफेद खनिज तेलों का मूल्यांकन

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 143]

EVALUATION OF WHITE MINERAL OILS BY ULTRAVIOLET ABSORPTION

UDC 665·6/·7 : 665·761·6 : 543·422·6

© BIS 1993

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 1993

Price Group 2

Methods of Test for Petroleum, Petroleum Products and Lubricants Sectional Committee, PCD 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Methods of Test for Petroleum, Petroleum Products and Lubricants Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This Indian Standard aligns with ASTM D 2269-88 'Evaluation of white mineral oils by Ultraviolet Absorption' issued by the American Society for Testing and Materials (USA).

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 143]

EVALUATION OF WHITE MINERAL OILS BY ULTRAVIOLET ABSORPTION

1 SCOPE

1.1 This test method describes a procedure for the examination and evaluation of white mineral oils.

1.2 This test method is not applicable to oils containing additives soluble in dimethyl sulphoxide that exhibit fluorescence or fluorescence quenching properties.

1.3 This standard may involve hazardous materials, operations and equipments. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2 TERMINOLOGY

2.1 Transmittance, T — The ratio of radiant power transmitted by the mineral oil extract in its cell to the radiant power transmitted by the solvent control in its cell.

Discussion — Under the conditions of this test method:

$T = 10^{-abc}$ ....(1)

so that $-\log_{10} T = abc = A$

2.2 Absorbance, A — the logarithm to the base 10 of the reciprocal of the transmittance, T. In symbols:

$A = \log_{10} (1/T) = -\log_{10} T$......(2)

2.3 Sample Path Length, b, is expressed in centimetres.

2.4 Concentration, c — the quantity of sample contained in a unit quantity of solution. In this test method it is expressed in grams per litre.

2.5 Absorptivity, a — the absorbance divided by the product of path length and concentration. In symbols:

$a = A/bc$..............................(3)

3 SUMMARY OF TEST METHOD

A sample of oil is extracted with dimethyl sulphoxide and the ultraviolet absorbance of the extract is determined in the range from 260 to 350 nm. The absorbance is compared with that of a naphthalene standard.

4 SIGNIFICANCE AND USE

The ultraviolet absorption of white mineral oils is used to determine their suitability for use in food, drug, and cosmetic applications.

5 APPARATUS

5.1 Spectrophotometer, equipped to handle liquid samples in 1-cm path length cells. The instrument shall be capable of measuring absorbance with a repeatability of ±1·0 percent or better from an average at the 0·4 absorbance level in the spectral region around 290 nm with a nominal band width of 1 nm or less.

5.2 Fused Quartz Cells, two having path lengths of 1·00 ± 0·005 cm, or better.

5.3 Separatory Funnels, Glass Stoppered, 125-ml capacity, equipped with TFE-fluorocarbon stopcocks or other suitable stopcocks that will not contaminate the solvents used.

6 REAGENTS AND MATERIALS

6.1 Solvents

6.1.1 *Normal Hexane*

Pure grade, having an ultraviolet light absorbance not exceeding 0·02 down to 260 nm when measured in a 1-cm cell (Warning—*see* Note). The purity shall be such that the solvent control as defined in **7.3** shall have an absorbance curve compared to water showing no extraneous impurity peaks and no absorbance exceeding that of dimethyl sulphoxide compared to water at any wavelength in the range 260 to 350 nm, inclusive.

NOTE

Warning — Extremely flammable, harmful if inhaled. (*See* also **A-1**).

6.1.2 *Isooctane* — For use as a spectroscopic solvent.

NOTE

Warning — Extremely flammable, harmful if inhaled (*see* **A-2**).

6.1.3 *Dimethyl Suphoxide*

For use as spectroscopic solvent (*see* Note 1) (Warning — *see* Note 2) Pure grade, clear, water white, 99·9 percent dimethyl sulphoxide, m. p. 18·5°C, with an absorbance curve compared to water not exceeding 1·0 at 264 nm and showing no extraneous impurity peaks in the wavelength range up to 350 nm when measured through a path length of 1 cm.

NOTES

1 This solvent can be purified by percolation through a 4-ft (1·2 m) column of type CAL 12 by 40 mesh activated charcoal. The columns is 1 in. (25 mm) in diameter, drawn to 1/4 in. (6·4 mm) in diameter at the bottom and has a reservoir at the top for containing the liquid. Glass wool is placed in the bottom of the column, and about 1/2 in. (13 mm) of 25 to 200 or 100 to 200 mesh silica gel is placed on top of it. The column is then filled with activated charcoal and the spectroscopic solvent poured into the reservoir and allowed to percolate through the charcoal at atmospheric pressure. The purified solvent is collected at the bottom of the column and stored in glass-stoppered bottles as it is very hygroscopic and reacts with some metal containers in the presence of air.

2 **Warning** — Combustible, rapidly absorbed through skin (*see* also **A-3**).

6.2 Naphthalene — high purity, 99 + percent.

6.3 Standard Reference Solution

A solution containing 7·0 mg of naphthalene per litre of purified isooctane.

6.4 Standard Reference Spectrogram

The absorbance curve obtained by scanning the standard reference solution in the range from 260 to 350 nm against isooctane of the same spectral purity as that used to prepare the standard.

6.5 Standard Reference Absorbance

The absorbance at 275 nm of the standard reference spectrogram.

NOTE — This absorbance will be approximately 0·30.

7 PROCEDURE

7.1 Transfer 25 ml of the mineral oil and 25 ml of hexane to a separatory funnel and mix. Add 5·0 ml of dimethyl sulphoxide and shake the mixture vigorously for at least 1 min. Allow to stand until the lower layer is clear.

7.2 Transfer the lower layer to a separatory funnel, add 2 ml of hexane and shake the mixture vigorously. Allow to stand until the lower layer is clear. Draw off the lower layer, designated as mineral oil extract, into a 1-cm cell.

7.3 Add 5·0 ml of dimethyl sulphoxide to 25 ml of hexane in a separatory funnel. Shake vigorously for at least 1 min and allow to stand until the lower layer is clear. Draw off this layer, designated as solvent control, into a 1-cm cell.

7.4 Determine the absorbance of the mineral oil extract compared to the solvent control through the range 260 to 350 nm inclusive.

8. CORRECTION FOR INHIBITOR CONTENT

8.1 A correction for the absorbance due to inhibitor may be made as described below if a sufficient amount of the same inhibitor contained in the sample and the inhibited sample are avilable to prepare a blend. The concentration of additional inhibitor to be added to the inhibited sample should be equal to the concentration contained in the inhibited sample.

NOTE — The inhibitor content is usually expressed in pounds per thousand barrels. Pound per thousand barrels × 0·002 85 = grams per litre. For example, 3 lb/1 000 barrels × 0·002 85 = 0·008 55 g/litre.

8.2 Weigh a minimum of 50 mg of inhibitor in a volumetric flask, fill to volume with inhibited sample and mix thoroughly. Make further dilutions with inhibited sample, as necessary, to obtain the desired concentration of added inhibitor.

8.3 Run the original inhibited sample and label it Run A.

8.4 Run the blend containing known amount of added inhibitor and label it Run B.

8.5 Calculate the difference in absorbance between Run B and Run A at corresponding spectral positions as follows:

$$\triangle A = A_b - A_a$$

where

$\triangle A$ = difference in absorbance at a given spectral position;

A_b = absorbance of Run B at the same spectral position; and

A_a = absorbance of Run A at the same spectral position.

8.5.1 Correct the absorbance at each spectral as follows:

$$A_c = A_b - \triangle A$$

where

A_c = corrected absorbance at each spectral position.

8.6 Mark the points of inflection on the spectrogram from Run A at wavelengths lower and higher than those which were increased.

8.6.1 Draw a baseline tangent to the curve connecting the two points.

8.6.2 Read the absorbance A_d, along the baseline at each spectral position.

8.7 Compare A_d and A_c at each position. If A_c is less than A_d it is indicated that the inhibitor content of the original sample is less than the amount added.

8.8 Use the absorbance A_c or A_d, whichever is greater, to compare to the solvent control through the range 260 to 350 nm, inclusive.

9. REPORT

Report the difference between the absorbance of the mineral oil extract and the solvent control at the wavelength desired.

10 PRECISION AND BIAS

10.1 The precision of this test method as obtained by statistical examination of interlaboratory test results is as follows.

10.1.1 *Repeatability*

The difference between successive test results obtained by the same operator with the same apparatus under constant operating conditions on identical test material, would in the long run, in the normal and correct operation of the test between method exceed 0·014 absorbance units only in one case in twenty.

10.1.2 *Reproducibility*

The difference between two single and independent results obtained by different operators working in different laboratories on identical test material, would in the long run, in the normal and correct operation of the test method, exceed 0·044 absorbance units only in one case in twenty.

10.1.3 These precision data were obtained on absorbances in the wavelength region 275 to 280 nm.

10.2 Bias

This procedure has no bias because the value of absorbance can be defined only in terms of a test method.

ANNEX A

(*Clauses* 6.1.1, 6.1.2 *and* 6.1.3)

PRECAUTIONARY STATEMENTS

A-1 *n*-HEXANE

May produce nerve cell damage. Vapours may cause flash fire.

Keep away from heat, sparks, and open flame.

Keep container closed.

Use with adequate ventilation.

Avoid build-up of vapours and eliminate all sources of ignition, especially all non-explosion proof electrical apparatus and heaters.

Avoid breathing of vapour or spray-mist, use respiratory protection devices as required.

Avoid skin and eye contact; use impermeable gloves and aprons as required.

A-2 ISO-OCTANE

Harmful if inhaled. Vapours may cause flash fire.

Keep away from heat, sparks and open flame.

Keep containers closed.

Use with adequate ventilation.

Avoid build-up of vapours and eliminate all sources of ignition, especially non-explosion proof electrical apparatus and heaters.

Avoid prolonged breathing of vapour or spray mist.

Avoid prolonged or repeated skin contact.

A-3 DIMETHYL SULFOXIDE

Hygroscopic. Keep container closed.

Keep away from heat, sparks, and open flame.

Use with adequate ventilation.

Avoid prolonged or repeated contact with skin; use impermeable gloves as required.

Avoid breathing of vapours.

Avoid skin contact with solution of dimethyl sulfoxide.

Do not take internally.

Wash thoroughly after handling.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or produceres may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmoious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Addition'. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. PCD 1 (1089)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75
Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VIII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61 37 86 26, 37 86 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43, 53 16 40 53 23 84
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42 235 15 19, 235 23 15
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	632 92 95, 632 78 58 632 78 91, 632 78 92

Branch : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD, GUWAHATI. HYDERABAD. JAIPUR. KANPUR LUCKNOW. PATNA. THIRUVANANTHPURAM.

Printed at Printwell Printers, Aligarh, India